

Circles, Area, Surface Area and Volume: practice solutions, Grade 7 – download the PDF

Written solutions to the chapter problems. Check each step, then correct yourself.

1 Radius or diameter?



The radius is half of the diameter, and the diameter is twice the radius.

a. $r = 14 \div 2 = 7$ cm.

b. $d = 2 \times 2.5 = 5$ in.

c. $r = 9 \div 2 = 4.5$ ft.

2 Fencing a pond



The fence follows the circumference. $C = \pi d \approx 3.14 \times 12 = 37.68$.

The fence is about **37.68 m** long.

3 A small circle



$$A = \pi r^2 \approx 3.14 \times 5^2 = 3.14 \times 25 = 78.5.$$

The area is about **78.5 cm²**.

4 Triangle and parallelogram



a. $A = \frac{1}{2} \times 14 \times 9 = 7 \times 9 = 63 \text{ in}^2$.

b. $A = b \times h = 11 \times 6 = 66 \text{ cm}^2$.

5 True or false?



a. **False.** For $r = 3$: $A = 3.14 \times 9 = 28.26$. For $r = 6$: $A = 3.14 \times 36 = 113.04$. Since $113.04 \div 28.26 = 4$, the area is multiplied by 4, not 2.

b. **True.** $C = \pi d$ and $\pi \approx 3.14$ is a little more than 3.

c. **False.** The diameter is *twice* the radius.

6 Aquarium volume



$$V = \ell \times w \times h = 24 \times 10 \times 12 = 240 \times 12 = 2,880.$$

The aquarium holds $2,880 \text{ in}^3$.

7 Wrapping a cube



A cube has 6 identical square faces, each of area $5 \times 5 = 25 \text{ cm}^2$.

$SA = 6 \times 25 = 150$. You need 150 cm^2 of paper.

8 Trapezoid garden bed



$$A = \frac{1}{2}(7 + 13) \times 5 = \frac{1}{2} \times 20 \times 5 = 10 \times 5 = 50.$$

The area is 50 m^2 .

9

Bicycle wheel

One turn covers the circumference: $C = 3.14 \times 26 = 81.64$ in.

For 50 turns: $81.64 \times 50 = 4,082$ in.

Since $1 \text{ ft} = 12 \text{ in}$: $4,082 \div 12 \approx 340.2$.

The bike travels **4,082 in**, or about **340.2 ft**.

10

From circumference to radius

From $C = \pi d$ we get $d = C \div \pi$.

$d = 47.1 \div 3.14 = 15$ cm, because $3.14 \times 15 = 47.1$.

The radius is $15 \div 2 = 7.5$ cm.

The diameter is **15 cm** and the radius is **7.5 cm**.

11

Which pizza deal?

12-inch pizza: $r = 6$, so $A = 3.14 \times 6^2 = 3.14 \times 36 = 113.04$ in².

8-inch pizza: $r = 4$, so $A = 3.14 \times 4^2 = 3.14 \times 16 = 50.24$ in². Two of them:
 $2 \times 50.24 = 100.48$ in².

$113.04 - 100.48 = 12.56$.

The single **12-inch pizza** is the better deal, with **12.56 in²** more pizza.

12

Garden with a pond

Garden: $15 \times 8 = 120$ m². Pond: $3.14 \times 2^2 = 3.14 \times 4 = 12.56$ m².

$120 - 12.56 = 107.44$.

107.44 m² of the garden is not covered by water.

13 Tent fabric



Two triangular ends: $2 \times \frac{1}{2} \times 6 \times 4 = 24 \text{ ft}^2$.

Floor: $6 \times 9 = 54 \text{ ft}^2$. Two slanted sides: $2 \times (5 \times 9) = 90 \text{ ft}^2$.

$$SA = 24 + 54 + 90 = 168.$$

The tent needs **168 ft²** of fabric.

14 Volume of a ramp



Base area: $B = \frac{1}{2} \times 10 \times 6 = 30 \text{ cm}^2$.

$$V = B \times h = 30 \times 15 = 450.$$

The volume is **450 cm³**.

15 A pyramid-shaped box



Base: $10 \times 10 = 100 \text{ cm}^2$.

One triangular face: $\frac{1}{2} \times 10 \times 13 = 65 \text{ cm}^2$. Four faces: $4 \times 65 = 260 \text{ cm}^2$.

$$SA = 100 + 260 = 360. \text{ The surface area is } \mathbf{360 \text{ cm}^2}.$$

16 Find the missing measurement



a. $A = b \times h$, so $h = 84 \div 12 = 7 \text{ cm}$.

b. $A = \frac{1}{2}bh$, so $45 = \frac{1}{2} \times b \times 9$, which gives $45 = 4.5b$ and $b = 10 \text{ in}$.

17 The sports field



The two semicircles together make one full circle of diameter 50 m (radius 25 m).

- a. Two straight sides: $2 \times 80 = 160$ m. Circle: $3.14 \times 50 = 157$ m. Distance around:
 $160 + 157 = 317$ m.
- b. Rectangle: $80 \times 50 = 4,000$ m². Circle: $3.14 \times 25^2 = 3.14 \times 625 = 1,962.5$ m².
Area: $4,000 + 1,962.5 = 5,962.5$ m².
- c. $3 \times 317 = 951$ m.

18 Path around a fountain



The outer circle has a radius of $4 + 1.5 = 5.5$ m. Path area = outer circle – fountain.

Outer circle: $3.14 \times 5.5^2 = 3.14 \times 30.25 = 94.985$. Fountain:

$$3.14 \times 4^2 = 3.14 \times 16 = 50.24.$$

$$94.985 - 50.24 = 44.745 \approx 44.7.$$

The path has an area of about **44.7 m²**.

19 Filling a water tank



a. $V = 2 \times 1.5 \times 1.2 = 3.6$ m³.

b. $3.6 \times 1,000 = 3,600$ L.

c. $3,600 \div 45 = 80$ minutes.

The tank holds **3,600 L** and is full after **80 minutes**.

20 A box without a lid



Bottom: $30 \times 20 = 600 \text{ cm}^2$.

Two long sides: $2 \times (30 \times 15) = 900 \text{ cm}^2$. Two short sides: $2 \times (20 \times 15) = 600 \text{ cm}^2$.

$600 + 900 + 600 = 2,100$. The box uses **2,100 cm²** of cardboard.

(A closed box would also count a top of 600 cm^2 , giving $2,700 \text{ cm}^2$.)

21 Swimming pool



a. The parallel sides are the two depths: $B = \frac{1}{2}(1 + 3) \times 20 = 2 \times 20 = 40 \text{ m}^2$.

b. $V = B \times h = 40 \times 10 = 400 \text{ m}^3$.

c. $400 \times 1,000 = 400,000 \text{ L}$.

The pool holds **400 m³**, which is **400,000 L**.

22 Find the error



a. The student squared the **diameter**. The formula needs the **radius**, which is $10 \div 2 = 5 \text{ cm}$.

b. $A = 3.14 \times 5^2 = 3.14 \times 25 = 78.5 \text{ cm}^2$.

c. $314 \div 78.5 = 4$. The answer was **4 times** too large, because the diameter is twice the radius, and $2^2 = 4$.



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